

Autonomous Micro-Modular Mobile Data Center Cloud Computing Study for Modeling, Simulation, Information Processing and Cyber-Security Viability

Completed Technology Project (2012 - 2012)



Project Introduction

Cloud computing environments offer opportunities for malicious users to penetrate security layers and damage, destroy or steal data. This ability can be exploited to study and detect how this is done, and build algorithms to better protect cloud computing environments. This project used an autonomous micro-modular mobile data center as a test-platform for an "infrastructure-as-a-service" cloud computing solution at the National Center for Critical Information Processing and Storage (NCCIPS). A Relocatable Adaptive Suspension Equipment Rack (R.A.S.E.R DX), on loan from Elliptical Mobile Solutions, was used as a demonstration project to study trends, activities and vulnerabilities in cloud computing environments.

Cloud computing security penetration testing and anomaly detection defense studies were conducted to assess the adequacy of cloud computing security. Since cloud computing involves data distributed over wide areas and multiple devices being shared by unrelated users, the security challenges become increasingly complex. Additionally, with the advent of cyber warfare as a threat, protecting data from theft or alteration does not in itself neutralize the threat, as the adversary also seeks to disrupt critical infrastructure and services such as penetration into data center server networks, and automated security access control. It has therefore become increasingly important to complement security capabilities with advances in automated intelligence (AI) to recognize the plans of multiple agent threats (software or human) based on the observation of their activities. Therefore, for this project, an autonomous micro-modular mobile data center was used as a test/demonstration platform to study cloud computing security.

Anticipated Benefits

The use of cloud computing at NASA will allow the agency to improve threat security by monitoring activity of many users from different organizations. Conducting the studies and sharing results with the NASA community, utilizing data center subject matter experts at the nationally recognized NCCIPS, offers the unique opportunity to conduct an otherwise high-risk, high-cost engineering study, and leverages current NASA data center expertise and existing NCCIPS infrastructure support.



Logo for the Office of Chief Technologist

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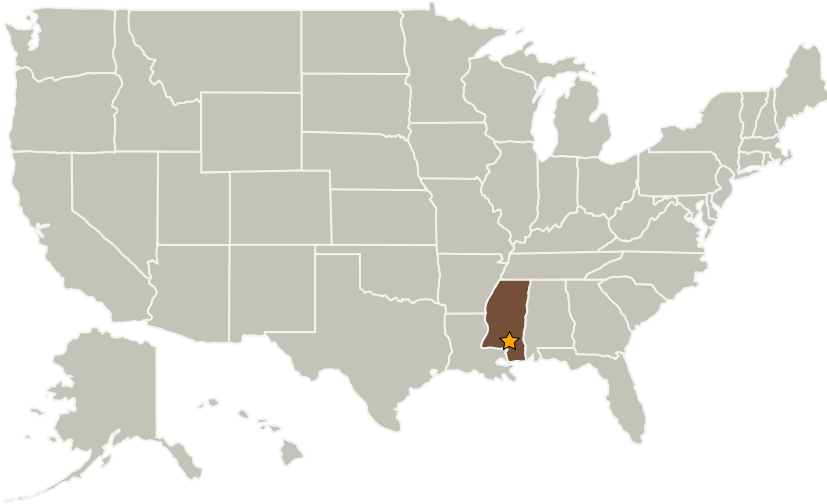
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Primary U.S. Work Locations and Key Partners



Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Stennis Space Center (SSC)

Responsible Program:

Center Innovation Fund: SSC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

Ramona E Travis

Project Manager:

Wanda M Solano

Principal Investigator:

Wanda M Solano

Organizations Performing Work	Role	Type	Location
★Stennis Space Center(SSC)	Lead Organization	NASA Center	Stennis Space Center, Mississippi
National Center for Critical Information Processing and Storage(NCCIPS)	Supporting Organization	US Government	Stennis Space Center, Mississippi
Science Applications International Corporation(SAIC)	Supporting Organization	Industry	Boulder, Colorado
University of Southern Mississippi	Supporting Organization	Academia	Hattiesburg, Mississippi

Primary U.S. Work Locations

Mississippi

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Images



Office of Chief Technologist

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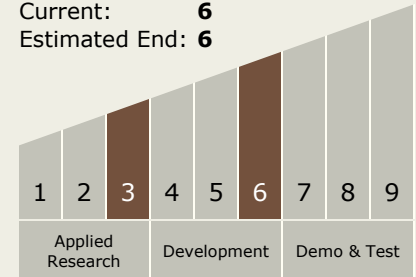
(<https://techport.nasa.gov/image/4010>)

Technology Maturity (TRL)

Start: 3

Current: 6

Estimated End: 6



Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
 - └ TX11.4 Information Processing
 - └ TX11.4.6 Cyber Security